Gastric volvulus and associated gastro-oesophageal reflux

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Abstract

Between 1984 and 1994, 10 neurologically normal children between 2 and 24 months were diagnosed as having gastric volvulus with associated gastro-oesophageal reflux (GOR). The common features at presentation were episodic colicky abdominal pain, non-bilious vomiting, upper abdominal distension, haematemesis, and failure to thrive. Anterior gastropexy and conservative management of GOR was curative.

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Gastric volvulus, first described by Berti in 1866,¹ is a rare condition in children with approximately 125 documented cases up to 1993. An abnormality of the diaphragm or deficient gastric hiatal attachments is present in 60%.² Borchardt's triad³ of unproductive retching, acute epigastric distension, and inability to pass a nasogastric tube are not reliable in an infant or child who may have unrelated conditions that could present with similar manifestations. Hence a new scoring system appropriate for children is introduced.

Patients and methods

Between 1984 and 1994, 10 children (five girls and five boys) were diagnosed as having gastric volvulus and gastro-oesophageal reflux (GOR). The mean age at presentation was 11.2 months (range 2-24 months). The common clinical features were vomiting since birth and failure to thrive in all patients, and two had a history of chronic chest infection. Seven had other major associated anomalies as described below and two had malrotation and asplenia. All children had a barium contrast study to establish the diagnosis of gastric volvulus and GOR, and to demonstrate other abnormalities of the gastrointestinal tract.

ACUTE CLINICAL FEATURES AND OPERATIVE FINDINGS

Upper abdominal distension and colicky abdominal pain before non-bilious vomiting and haematemesis was the common acute clinical presentation in all children. A clearly demonstrable succussion splash was audible in four older children.

At laparotomy three had mesentericoaxial gastric volvulus, six organoaxial gastric volvulus, and a mixed gastric volvulus was seen in

one patient. Anterior gastropexy was the standard surgical procedure in all patients. Ladd's procedure and widening of the mesenteric base, repair of the paraoesophageal hernia and plication of the diaphragm, were the additional corrective operations adopted in cases with malrotation, paraoesophageal hernia, and eventration of the diaphragm.

PATIENT DETAILS

An infant (4 months of age) with an isolated haemangioma of the anterior gastric wall had a large floppy stomach with a biplanar rotation, mixed volvulus. Extensive ischaemia of the body and the antrum of the stomach was noticed which reversed on derotation. The haemangiomatous component had significantly contributed to the haemorrhage.

In a 2 month old, a diverticulum of the anterior gastric wall was seen in association with an organoaxial volvulus and deficient fixation by the gastrophrenic and gastrohepatic ligaments. The diverticulum was not excised but was used as one of the points of fixation.

In two patients aged 21 and 24 months with mesentericoaxial volvulus, there was absence of a fixed duodenum due to malrotation, an absent gastrosplenic ligament due to asplenia, and lax gastrohepatic and gastrocolic ligaments.

Two children presented with chronic chest infection and an acute episode of haematemesis. The chest infection was a reflection of the severity of GOR. Barium contrast study and pH probe analysis confirmed GOR and organoaxial gastric volvulus.

The associated abnormalities found in the other three patients were left sided diaphragmatic eventration, paraoesophageal hernia, and cardiac defect (atrial/ventricular septal defect). One child had an isolated gastric volvulus and GOR.

Results

Follow up has been for a mean period of 58.8 months (range 4-120 months). GOR resolved on conservative medical management. There has been no recurrence of vomiting, abdominal distension, pain, or haematemesis. All the children are gaining weight and thriving.

Discussion

Gastric volvulus is an abnormal rotation of one part of the stomach around another along its coronal or sagittal axis due to attenuation or absence of ligamental attachments. It is classified into organoaxial, mesentericoaxial, and

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Figure 1 (A) Organoaxial gastric volvulus: the greater curvature usually rotates forwards along the long axis, that is the line joining the hiatus and the pylorus. (B) Mesentericoaxial gastric volvulus: the pylorus or the cardia commonly rotates anteriorly along the line joining the greater and lesser curvatures. (C) Mixed gastric volvulus: biplanar mixed gastric volvulus. A posterior rotation is possible in all three types.

mixed biplanar gastric volvulus. Figure 1 describes the three rotational abnormalities of the stomach and the displaced segment often passes anteriorly as documented in all our children. The fixation of the stomach is normally achieved by the four gastric ligaments, namely gastrophrenic, gastrohepatic, gastrosplenic, and gastrocolic and by the retroperitoneal fixation of the duodenum. A normal stomach in a cadaver does not tend to rotate beyond 180° , however, division of the ligaments permits rotation between 180° to 360° .⁴ Attenuation or absence of the ligamental attachments to the stomach, or associated predisposing conditions such as diaphragmatic hernia, eventration, or oesophageal hiatal hernia, can result in abnormal mobility of the stomach and the potential for volvulus. Over distension of the transverse colon and the small intestine by air would cause the greater curvature of the stomach to be pushed upwards, increasing the potential for volvulus in an anatomically unstable stomach. Thus, in a partial volvulus the gastric contents remain in the fundus, allowing large volumes of air to pass through the pylorus to the small intestine and the transverse colon causing marked dilatation. A large dilated transverse colon

could impinge on an unstable stomach due to deficient ligamental fixation, resulting in rotation of the stomach either in the organoaxial or mesentericoaxial or combined planes. If the torsion is greater than 180° , a partial to complete strangulation of the stomach can occur. The process is facilitated by other anatomical abnormalities such as asplenia associated with an absent gastrosplenic ligament and malrotation, diaphragmatic and oesophageal hiatal anomalies with lax or absent gastrophrenic or gastrohepatic ligaments, or abnormalities of the stomach as seen in our patients.

GOR was a common associated disorder in all our children, and haematemesis was one of the common symptoms. The clinical symptoms depend on the degree of rotation and obstruction, and upon the patency of the

Figure 2 (A) Barium meal of a 24 month old girl with an organoaxial volvulus. The body of the stomach is rotated across the midline and the pylorus (P: curved arrow) is situated at the level of the gastro-oesophageal junction (GOJ). Thick arrows delineate the stomach. (B) Barium meal and follow through of a 22 month old girl with a mesentericoaxial gastric volvulus and malrotation. The fundus (F: single arrow) lies below both the greater curvature (thick arrows) and the pylorus (P: double arrows). The pylorus is to the right of the midline, and the duodenum continues on the right (curved arrow), demonstrating a malrotation (MAL).

blood supply to the stomach. Haematemesis was an indicator of an acute exacerbation of the underlying pathology, as it represents gastric mucosal tears due to oedema and inflammatory changes resulting from episodic gastric volvulus, and is also a reflection of the underlying oesophagitis due to GOR. In the present series, haematemesis occurred after each episode of gastric volvulus. An immediate contrast study accompanied by timely pre-emptive emergency gastroscopy and surgery is recommended. GOR was successfully treated by conservative management, without any need for fundoplication.⁵ Two of our patients had chronic chest infection, which was a reflection of the severity of GOR.

Primary radiological investigations must include a plain x ray film of the chest and the abdomen as 60% of the reported cases of gastric volvulus are associated with diaphragmatic hernia, eventration, or oesophageal hiatal hernia.² A mesentericoaxial volvulus on an erect plain x ray film would demonstrate a large gastric shadow with double air fluid levels in the fundus and the antrum of the stomach, and an organoaxial volvulus would be seen as a large horizontal stomach with a single fluid level. However, a partial or a chronic volvulus would show gaseous dilatation of the stomach and the intestine. Barium contrast examination is diagnostic and a classical demonstration of organoaxial and mesentericoaxial gastric volvulus is shown in fig 2.

Anterior gastropexy was the mode of treatment in all our children. This procedure was accompanied by correction of associated abnormalities, which included plication of the diaphragm for eventration, repair of the paraoesophageal hernia, and Ladd's procedure for malrotation. We believe GOR can be

managed conservatively without the need for fundoplication.

Conclusions

(1) Acute gastric volvulus is a surgical emergency as delay could result in gastric gangrene.^{2,6} Gastric volvulus should be treated by anterior gastropexy. Gastric volvulus *per se* is due to either the absence or maldevelopment of the normal anatomical anchors, hence to recommend conservative management⁶ is difficult to justify.

(2) Radiological investigations should include a plain x ray film of the chest and the abdomen, followed by barium contrast study to delineate the type of gastric volvulus and any associated anomalies.

(3) Borchardt's triad³ is inapplicable to children. The diagnosis of gastric volvulus must be suspected when an infant presents with the following pentology of clinical manifestations: (i) intermittent colicky abdominal pain, (ii) non-bilious vomiting, (iii) upper abdominal distension, (iv) failure to thrive, and (v) haematemesis.

Perhaps gastric volvulus is more common than generally thought and should be suspected and specifically looked for in a neonate or infant with the above symptomatology.

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